REMARKS

Claims 7, 8, 11-16, 25 and 26 are cancelled.

Claims 27 and 28 are added such that claims 1-6, 9-10, 17-24, 27 and 28 are pending.

Restriction Requirement

Responsive to the Examiner's Restriction Requirement made on January 10, 2003, applicant elects to prosecute the invention of Group I, drawn on claims 1-6, 9-10 and 17-24 and new claims 27-28. Claims 11-16, 25 and 26 are withdrawn from further consideration as being drawn to a non-elected invention.

Allowable Subject Matter

Claims 7 and 8 were indicated allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 7 and 8 are cancelled herein and rewritten as independent claim 27 and dependent claim 28, respectfully, which include all of the limitations of the original base claim and all intervening claims. Thus, claims 27 and 28 are believed allowable and passage as such is earnestly requested.

Claim Rejections under 35 USC §102(b)

Claims 1-5, 9-10, 17-18, and 21-24 were rejected under 35 USC §102(b) as being anticipated by Shelor U.S. Patent No. 3,661,703.

Shelor '703 discloses a decurling apparatus 16 for changing the curl characteristics of a web 12. Dependent upon the degree and direction of curl of the web 12, a pair of decurling rollers 34, 36 are movably positioned to effect a change in the geometry of the path of web 12, which effectively changes the curl in the web 12. In Figure 3, the rollers 34, 36 are positioned to remove a downward curl in web 12. In Figure 4, the rollers 36, 34 are positioned to remove an upward curl in the web. The unique aspect of the Shelor '703 decurling apparatus 16 is that as the position of rollers 34, 36 changes, the position of compensating roller 72 also changes such that no change in web path length results. Shelor '703 teaches that a change in web path length is objectionable because it produces a loss of registry between the web 12 and apparatus

which operates upon the web either before the web reaches the decurling unit or after it emerges therefrom.

Claim 1

Claim 1 of the present application recites an apparatus for decurling a running web delivered from a supply roll and fed to a downstream conversion process operating at a line web tension. The apparatus comprises an upstream brake roll receiving and rotatably engaging the web from the supply roll and a downstream pull roll receiving and rotatably engaging the web from the brake roll, the brake roll and the pull roll operative to create in the web therebetween a zone of tension greater than the line web tension. A decurler roll is located in the web tension zone and rotatably engages the outer face of the web with respect to web orientation on the supply roll. A decurler roll adjustment mechanism is operative to adjustably position the decurler roll to deflect the web from a normal path of web travel through the web tension zone and to vary the angle of circumferential wrap of the web on the decurler roll.

Claim 1 is not anticipated by the Shelor '703 reference for the following reasons. Claim 1 recites a brake roll and a pull roll operative to create in the web therebetween a zone of tension greater than the line web tension. Shelor '703 does not teach such structure or function. In contrast, Shelor '703 teaches against the claimed invention by teaching an apparatus explicitly designed to maintain web path length, and thus maintain web tension, in a web being decurled.

As column 3, lines 34-37 state:

> The change in web path geometry produced by the compensating roller 72 compensates for that produced by the decurling roller 34. Therefore no change in web path length results.

As column 4, lines 61-67 state:

> A certain length of web is obtained between point A at turn roller 26 and point B at turn roller 28. During operation of the decurling unit 16, the length of web between points A and B must remain constant to ensure that systems proceeding or following unit 16 are free from change in the relative positions of the web and elements of the system.

The concept of increasing web tension in a web being decurled is thus neither taught nor suggested by the Shelor '703 reference.

Known decurling apparatus, such as the Shelor '703 reference, operate by causing the web to be back wrapped around a decurler bar or a decurler roll in the opposite direction from which the web was wound on the supply roll. Typically, the decurler bar or decurler roll has a relatively small diameter so that a small radius back wrap is imparted to the running web to remove the curl. It is also well known to place the decurler roll in close proximity to one of the transfer rolls but, because the back wrap or back bending of the web around the smaller diameter decurler roll is much more severe, the set caused by the original curl may be reversed and the web flattened.

As the present application states at page 1, lines 29-31 through page 2, lines 1-4:

> ...back bending a web around a small diameter roll often results in damage to the surface of the sheet. This damage, commonly referred to as checking or cracking, appears as permanent wrinkles or creases throughout the surface of the web on the face that contacts the small diameter roll. Checking or cracking is the result of compressive failure of the web face and can adversely affect the surface of a paper web, the coating on a web, and/or the bond between the coating and the paper. Other web materials may be similarly adversely affected.

The disadvantages of the process described above and taught by Shelor '703 are overcome by the present invention. By manipulating the tension in the web to be decurled, the invention of claim 1 lessens the potential for damage to the web to be decurled and provides a simple inexpensive method for effectively removing curl from a web. For example, tensioning of the web prior to decurling eliminates checking and cracking, as page 2, lines 9-15 state:

> It is believed that, by raising the overall web tension prior to back wrapping the web around the small diameter decurler roll, the inside face of the web in contact with the decurler roll can absorb the compressive forces of bending without failure resulting in checking. Simultaneously, the outside of the pretensioned web is stretched further due to the tensile forces of bending. The stretching of the outside web face results in a yielding of the paper fibers which removes the curl or set.

The unique structure and function of the brake roll and pull roll create increased tension in the web for decurling without effecting web tension upstream from the web supply roll and downstream in the converting process operating at a desired line tension. This represents a substantial departure from and improvement over the art, including the Shelor '703 reference. The brake roll and pull roll of claim 1 also facilitate the ability to quickly move from "maximum decurl" to "minimum decurl", which is especially important for high speed automatic operations.

The claimed apparatus having brake and pull rolls designed to manipulate web tension is not taught or suggested by the prior art. Such an arrangement a substantial improvement over the prior art and thus Claim 1 is believed allowable and passage as such is earnestly requested.

Claims 2-9

Claim 2 recites the apparatus of claim 1 including a rotatable pivot roll mounted in counterrotating relation with the decurler roll to carry the web in the tension zone in engagement with the inner face of the web. Claim 1 is believed allowable for the reasons stated above as well as the subject matter recited therein. Specifically, Shelor '703 does not disclose a rotatable pivot roll mounted in counterrotating relation with the decurler roll to carry the web in the tension zone in engagement with the inner face of the web. The decurling rollers 34, 36 cited by the Examiner as operative to move around the circumference of the compensating roll 72, in fact are not capable of such range of movement. As detailed at column 2, lines 24-42, the decurling rollers 34, 36 are only free to move along a range shown in Figures 3 and 4 and defined by elevator means 32.

Claim 3 recites the apparatus of claim 2 wherein the pivot roll has a diameter substantially greater than the diameter of the decurler roll, the pivot roll mounted directly adjacent to the decurler roll. Claim 3 is believed allowable for the reasons stated above as well as for the subject matter recited therein. Specifically, the Shelor '703 reference does not disclose a pivot roll mounted directly adjacent the decurler roll. As is clearly shown in Figures 2-4, the decurler rolls 34, 36 are spaced apart from the compensating roll 72. Such an arrangement is necessary for the device of

Shelor '703 to function because there must be room for the compensating roll 72 to move when actuated by the compensating means 38. As column 2, lines 7-9 state: "Elevator means 32 supports decurling rollers 34 and 36 and varies the position of the decurling rollers in response to operation of the drive means 40." As column 2, lines 73-75 and column 3, lines 1-3 state: "The compensating means 38 responds to relative movement between the web 12 and the decurling rollers to change web path geometry in a manner which compensates for the tendency of web path length to vary when the aforesaid relative movement between the web and decurling rollers occurs." Thus, Shelor '703 does teach and cannot accommodate a pivot roll mounted directly adjacent to the decurler roll.

Claim 4 recites the apparatus as set forth in claim 3 wherein the decurler roll adjustment mechanism is operative to move the decurler roll around the circumference of the pivot roll to simultaneously vary the angle of circumferential wrap of the web on the pivot roll and the decurler roll. Claim 4 is believed allowable for the reasons stated above as well as the subject matter recited therein. Specifically, Shelor '703 does not teach an adjustment mechanism that is operative to move the decurler rolls 34, 36 around the circumference of the pivot roll. As detailed above, the decurler rolls 34, 36 are only capable of moving in the range defined by elevator means 32 and shown in Figures 2-4.

Claim 5 recites the apparatus as set forth in claim 4 wherein the adjustment mechanism comprises a pair of mounting brackets, each attached at a radial inner end to a pivot shaft rotatable supporting the pivot roll and at a radial outer end to a journal connection to one axial end of the decurler roll. A drive operatively connected to the pivot shaft rotates the pivot shaft and mounting brackets and carries the decurler roll in an orbital path around the circumference of the pivot roll. Claim 5 is believed allowable for the reasons stated above as well as the subject matter recited therein. Specifically, as stated above, the Shelor '703 reference fails to teach a decurler roll designed to orbit the circumference of the pivot roll.

Claim 9 recites the apparatus as set forth in claim 1 including a brake roll drive operative to retard web movement and a pull roll drive operative to increase web

movement. Claim 10 recites the apparatus of claim 9 wherein the brake roll drive and pull roll drive are adjustable to selectively vary web tension in the web tension zone. Claims 9 and 10 are believed allowable for the reasons stated above as well as for the subject matter recited therein. Specifically, as stated above, the Shelor '703 reference fails to teach a device operative to retard web movement and increase web movement to selectively very web tension in the web tension zone. In contrast, Shelor '703 teaches against such an arrangement - decurling unit 16 is specifically designed to maintain web tension throughout the decurling process.

Claim 17

Claim 17 recites an apparatus for decurling a running web being delivered from a supply roll and fed to a downstream conversation process operating at a line web tension. The apparatus comprises a downstream brake roll receiving and rotatably engaging the web from the supply roll and a downstream pull roll receiving and rotatably engaging the web from the brake roll, the brake roll and pull roll operative to create in the web therebetween a zone of web tension greater than the line web tension. A pivot roll in the web tension zone rotatably engages the interface of the web with respect to web orientation on the supply roll. A decurler roll rotatably engages the outer face of the web with respect to web orientation on the supply roll. An adjustment mechanism is operative to move the decurler roll orbitally around the circumference of the pivot roll and to provide a desired amount of circumferential wrap of the web on both the decurler roll and the pivot roll.

Shelor '703 does not anticipate claim 17 for the following reasons. Similar to claim 1, claim 17 recites an apparatus for decurling a running web that includes a downstream brake roll and upstream pull roll operative to create in the web a zone of tension greater than line web tension. Similar to the argument set forth above for claim 1, these elements are not shown in the Shelor '703 reference. The Shelor '703 device operates to maintain web path length, and thus maintain web tension. Shelor '703 teaches means for adjusting the relative positions of decurler rollers 34, 36 and compensating roller 72 which function to maintain web tension. Upstream and downstream brake and pull rolls for receiving and rotatably engaging the web are not

shown. Shelor '703 further does not create a zone of tension greater than the line web tension.

Claim 17 further recites an adjustment mechanism operative to move the decurler roll orbitally around the circumference of the pivot roll and to provide a desired amount of circumferential wrap of the web on both the decurler roll and the pivot roll. As argued above for claim 4, the adjustment mechanisms taught by Shelor '703 are not operative to move the decurler roll orbitally around the circumference of the pivot roll. Thus, the structure and function taught in Shelor '703 is substantially different from that claimed by claim 17.

Claim 17 is thus believed allowable over the prior art and passage as such is earnestly requested.

Claims 18, 21-22

Claim 18 recites the apparatus as set forth in claim 17 wherein the decurler roll is substantially smaller is diameter than the pivot roll. Claim 18 is believed allowable for the reasons stated above as well as for the elements recited therein.

Claim 21 recites the apparatus as set forth in claim 17 including a drive motor for each of the brake roll and pull roll, the pull roll motor operative to drive the pull roll at an overspeed with respect to the web speed and the brake roll motor operative to retard the brake roll with respect to web speed. Claim 21 is believed allowable for the reasons stated above as well as the subject matter recited therein. Specifically, the Shelor '703 reference does not teach a pull roll driven by a variable speed motor. Shelor '703 simply teaches a drive means 40 comprising a reversible motor 42, a sprocket 44, a chain 46, a sprocket 48 for rotating a shaft 50 and a pair of gear boxes 52 each housing a gearing mechanism driven by the shaft 50. A variable speed motor is not shown.

Claim 22 recites the apparatus as set forth in claim 17 including a pull roll motor operative to drive the pull roll at variable overspeed with respect to web speed, and means for applying a variable retarding load to the pull roll. Claim 22 is believe allowable for the subject matter recited therein as well as for the reasons stated above.

Claim 23

Claim 23 recites an apparatus for decurling a running web delivered from a supply roll at an input web tension and fed to a downstream conversion process operating at a line web tension. The apparatus comprises upstream braking means for receiving and applying a web retarding load to the web from the supply roll and downstream pulling means for receiving and applying a web overdrive force to the web from the brake roll, the pulling means and braking means operative to create in the web therebetween a zone of increased tension greater than the input web tension and the line web tension. Decurling means in the web tension zone engage the outer face of the web with respect to web orientation on the supply roll and deflect the web from a linear path of travel. Means for controlling the braking means and the pulling means vary web tension in the tension zone.

Claim 23 is not anticipated by the Shelor '703 reference for the following reasons. As argued in detail above regarding claim 1, the Shelor '703 reference does not teach means for creating in the web a zone of increased tension greater than the input web tension and the line web tension. Shelor '703 does not teach upstream braking means or downstream pulling means for creating the increased zone of tension. Shelor '703 does not teach means for controlling the braking means and the pulling means to vary web tension in the tension zone. Claim 23 is thus believed allowable and passage as such is earnestly requested.

Claim 24

Claim 24 recites the apparatus set forth in claim 23 wherein the controlling means is operable to provide an output line web tension different from the input web tension. Claim 24 is believed allowable for the reasons stated above as well as the subject matter recited therein. Specifically, as detailed above, a controlling means for providing an output line web tension different from the input web tension is not taught in the Shelor '703 reference.

Claim Rejections Under 35 USC §103(a)

Claim 19

Claim 19 was rejected under 35 USC §103(a) as being unpatentable over Shelor '703. Claim 19 recites the apparatus set forth in claim 18 wherein the ratio of the diameters of the decurler and the pivot roll is about 1:4. Claim 19 depends indirectly from claim 17. Claim 19 is not rendered obvious by the Shelor '703 reference for the following reasons. As detailed above regarding claims 1, 17 and 23, the Shelor '703 device operates to maintain web path length, and thus maintain web tension, in a web being decurled. The Shelor '703 reference does not teach or suggest a brake roll and pull roll combination operative to create a zone of web tension greater than line web tension in the web. The Shelor '703 reference further does not teach or suggest an adjustment mechanism for a decurler roll operative to move the decurler roll orbitally around the circumference of the pivot roll. Claim 19 is thus not rendered obvious by the Shelor '703 reference and is believed allowable. Such action is earnestly requested.

Claims 6 and 20

Claims 6 and 20 were rejected under 35 USC §103(a) as being unpatentable over Shelor '703 in view of Kishine U.S. Patent No. 6,279,472.

Kishine '472 teaches a rotary printing press having a tension roller 8 and a turn bar 4a which are automatically driven to working positions with the startup of the printing press and retracted when the printing press is turned off.

Claim 6 depends from claim 2 and indirectly from claim 1 and further defines the claimed apparatus as including an infeed roller upstream of the brake wall and an outfeed idler roll downstream of the pull roll.

Claim 20 depends from claim 17 and further defines the claimed apparatus as including an infeed idler roll for the web upstream of the brake roll and an outfeed idler roll for the web downstream of the pull roll, and wherein the infeed roll, brake roll, pivot roll, pull roll and outfeed roll are mounted to define a serpentine path of web travel through the apparatus.

Claims 6 and 20 are not rendered obvious by the applied references for the following reasons. As detailed above regarding claims 1, 17 and 23, the Shelor '703

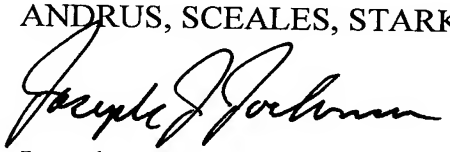
reference does not teach an apparatus designed to create in a web to be decurled a zone of tension greater than the line web tension. The Kishine et al '472 reference only teaches a printing press which causes a tension roller 8 and turn bar 41a to return to retracted positions when the machine is not started running for a prescribed length of time, 30 seconds for instance, after the actuation of the "ready" switch. Column 5, lines 23-27. When in operation, the web tension remains constant.

As such, the claim elements and scope of the present invention of claims 6 and 20 is not taught or suggested by the cited references. Claims 6 and 20 are thus believed allowable and passage as such is earnestly requested.

The present application is believed in condition for allowance with claims 1-6, 9-10, 17-24 and 27-28 and such action is earnestly requested.

Respectfully submitted,

ANDRUS, SCEALES, STARKE & SAWALL, LLP



Joseph J. Jochman
Reg. No. 25,058

Andrus, Sceales, Starke & Sawall, LLP
100 East Wisconsin Avenue, Suite 1100
Milwaukee, WI 53202
(414) 271-7590
Attorney Docket No.: 4470-00661